### Critical Area: Problem Solving in Addition and Subtraction; Place Value Meaning and Computation

**FOCUS for Grade 1**

<table>
<thead>
<tr>
<th>Major Work 70% of time</th>
<th>Supporting Work 20% of Time</th>
<th>Additional Work 10% of Time</th>
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<td>1.MD.A.1-2</td>
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</tbody>
</table>

Required fluency: **1.OA.C.6**

### Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. **Look for and make use of structure.**
8. Look for and express regularity in repeated reasoning.

* Standards **in bold** are specifically targeted within instructional materials.

### Domains:

**Operations and Algebraic Thinking**

**Clusters:**

Clusters outlined in **bold** should drive the learning for this period of instruction.

<table>
<thead>
<tr>
<th>1.OA.C</th>
<th>1.OA.A</th>
<th>1.OA.B</th>
<th>1.OA.D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add and subtract within 20.</td>
<td>Represent and solve problems involving addition and subtraction.</td>
<td>Understand and apply properties of operations and the relationship between addition and subtraction.</td>
<td>Work with addition and subtraction equations.</td>
</tr>
</tbody>
</table>

### Standards:

1. **1.OA.C.5** Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).
2. **1.OA.C.6** Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 − 4 = 13 − 3 − 1 = 10 − 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows that 12 − 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).
3. **1.OA.A.1** Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
4. **1.OA.B.3** Apply properties of operations as strategies to add and subtract. *Examples:* If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)
5. **1.OA.B.4** Understand subtraction as an unknown-addend problem. For example, subtract 10 − 8 by finding the number that makes 10 when added to 8.
6. **1.OA.D.8** Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = 3 − ? , 6 + 6 = ?.
<table>
<thead>
<tr>
<th>Foundational Learning</th>
<th>Future Learning</th>
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</thead>
<tbody>
<tr>
<td>K.OA.A</td>
<td>2.OA.A.1</td>
</tr>
<tr>
<td>K.NBT.A</td>
<td>2.OA.B.2</td>
</tr>
<tr>
<td>1.OA.A.1</td>
<td>2.NBT.B</td>
</tr>
</tbody>
</table>

### Key Student Understandings

- Two numbers can be added in any order (commutative property).
- Numbers can be broken apart and grouped in different ways to make calculations easier (associative property).
- Addition and subtraction are related; any subtraction calculation can be solved by adding up.
- The relationship between one quantity and another quantity can be an equality or inequality relationship.

### Assessments

- Formative Assessment Strategies
- Evidence for Standards-Based Grading

### Common Misconceptions/Challenges

1. **1.OA.C Add and subtract within 20.**
   - Students struggle with counting to subtract, because counting backward is difficult for children.

2. **1.OA.A Represent and solve problems involving addition and subtraction within 20.**
   - Students rely too heavily on a key word or phrase in a problem, and they use that word to decide on the operation needed to solve the task. It is very important that teachers do not teach key word strategies, but instead help students make sense of the situation.

3. **1.OA.B Understand and apply properties of operations and the relationship between addition and subtraction**
   - Students over-generalize the properties in regards to the relationship between addition and subtraction. They need to explore how numbers can be broken apart and put together for addition and then be challenged to verbalize what happens with subtraction situations. Students should explore commutative and associative property with subtraction in order to come to their own understanding of how these properties work in each situation.

4. **1.OA.D Work with addition and subtraction equations.**
   - Many children misunderstand the meaning of the equal sign. The equal sign means “is the same as” but most primary students believe the equal sign means “put the answer here”.
   - Students often ignore the equal sign in equations that are written in a nontraditional way. For instance, students find the incorrect value for the unknown in the equation $9 = \Delta - 5$ by thinking $9 - 5 = 4$. It is important to provide equations with a single number on the left as in $18 = 10 + 8$. Showing pairs of equations such as $11 = 7 + 4$ and $7 + 4 = 11$ gives students experiences with the meaning of the equal sign as “is the same as” and equations with one number to the left.
### Instructional Practices

**Domain:** 1.OA  
**Cluster:** 1.OA.C Add and subtract within 20.

**1.OA.C.5 Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).**

- When solving addition and subtraction problems to 20, First Graders often use counting strategies, such as counting all, counting on, and counting back, before fully developing the essential strategy of using 10 as a benchmark number. Once students have developed counting strategies to solve addition and subtraction problems, it is very important to move students toward strategies that focus on composing and decomposing number using ten as a benchmark number, as discussed in 1.OA.6, particularly since counting becomes a hindrance when working with larger numbers. By the end of First Grade, students are expected to use the strategy of 10 to solve problems.

- Counting All: Students count all objects to determine the total amount. Counting On & Counting Back: Students hold a “start number” in their head and count on/back from that number.

**Example:** $15 + 2 = \square$

**Counting All**  
The student counts out fifteen counters. The student adds two more counters. The student then counts all of the counters starting at 1 (1, 2, 3, 4, ...14, 15, 16, 17) to find the total amount.

**Counting On**  
Holding 15 in her head, the student holds up one finger and says 16, then holds up another finger and says 17. The student knows that $15 + 2$ is 17, since she counted on 2 using her fingers.

**Example:** $12 - 3 = \square$

**Counting All**  
The student counts out twelve counters. The student then removes 3 of them. To determine the final amount, the student counts each one (1, 2, 3, 4, 5, 6, 7, 8, 9) to find out the final amount.

**Counting Back**  
Keeping 12 in his head, the student counts backwards, “11” as he holds up one finger; says “10” as he holds up a second finger; says “9” as he holds up a third finger. Seeing that he has counted back 3 since he is holding up 3 fingers, the student states that $12 - 3 = 9$.

*(1st Grade Mathematics ● Unpacked Content, North Carolina Dept of Public Instruction)*
1.OA.C.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten; decomposing a number leading to a ten; using the relationship between addition and subtraction; and creating equivalent but easier or known sums; creating the known equivalent.

- In Grade 1, students learn about and use various strategies to solve addition and subtraction problems. When students repeatedly use strategies that make sense to them, they internalize facts and develop fluency for addition and subtraction within 10. When students are able to demonstrate fluency within 10, they are accurate, efficient, and flexible. Grade 1 students then apply similar strategies for solving problems within 20, building the foundation for fluency to 20 in Grade 2.

- Grade 1 students extend the sophistication of the methods they use to add and subtract. They advance from Level 1 to Level 2 methods of thinking (see chart).

- Counting on can be used to add (find a total) or subtract (find an unknown addend). To an observer watching the student, adding and subtracting look the same. Whether the problem is $9 + 4$ or $13 - 9$, we will hear the student say the same thing: “Niiiine, ten, eleven, twelve, thirteen” with four head bobs or four fingers unfolding. The differences are in what is being monitored to know when to stop, and what gives the answer.

- Counting on for subtraction is easier than counting down. Also, unlike counting down, counting on reinforces that subtraction is an unknown-addend problem. Learning to think of and solve subtractions as unknown addend problems makes subtraction as easy as addition (or even easier), and it emphasizes the relationship between addition and subtraction. The taking away meaning of subtraction can be emphasized within counting on by showing the total and then taking away the objects that are at the beginning. In a drawing this taking away can be shown with a horizontal line segment suggesting a minus sign. So one can think of the $9 + ? = 13$ situation as “I took away 9. I now have 10, 11, 12, 13 [stop when I hear 13], so 4 are left because I counted on 4 from 9 to get to 13.”

Note: Many children attempt to count down for subtraction, but counting down is difficult and error-prone. Children are much more successful with counting on; it makes subtraction as easy as addition.

*Progressions for the CCSSM, K-2, Operations and Algebraic Thinking, CCSS Writing Team, April 2011, page 22*
- Level 3 methods involve decomposing an addend and composing it with the other addend to form an equivalent but easier problem. This relies on properties of operations (1.OA.3). Students do not necessarily have to justify their representations or solution using properties, but they can begin to learn to recognize these properties in action and discuss their use after solving.

- Developing Fluency for Addition & Subtraction within 10, Extending to Addition and Subtraction within 20
  - Example: Two frogs were sitting on a log. 6 more frogs hopped there. How many frogs are sitting on the log now?

<table>
<thead>
<tr>
<th><strong>Counting-On</strong></th>
<th><strong>Internalized Fact</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>I started with 6 frogs and then counted up. Sixxx.... 7, 8. So there are 8 frogs on the log. 6 + 2 = 8</td>
<td>There are 8 frogs on the log. I know this because 6 plus 2 equals 8. 6 + 2 = 8</td>
</tr>
</tbody>
</table>

- Example: Sam has 8 red marbles and 7 green marbles. How many marbles does Sam have in all?

<table>
<thead>
<tr>
<th><strong>Making 10 and Decomposing a Number</strong></th>
<th><strong>Creating an Easier Problem with Known Sums</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>I know that 8 plus 2 is 10, so I broke up (decomposed) the 7 up into a 2 and a 5. First I added 8 and 2 to get 10, and then added the 5 to get 15. 7 = 2 + 5 8 + 2 = 10 10 + 5 = 15</td>
<td>I broke up (decomposed) 8 into 7 and 1. I know that 7 and 7 is 14. I added 1 more to get 15. 8 = 7 + 1 7 + 7 = 14 14 + 1 = 15</td>
</tr>
</tbody>
</table>

- Example: There were 14 birds in the tree. 6 flew away. How many birds are in the tree now?

<table>
<thead>
<tr>
<th><strong>Back Down Through Ten</strong></th>
<th><strong>Relationship between Addition &amp; Subtraction</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>I know that 14 minus 4 is 10. So, I broke the 6 up into a 4 and a 2. 14 minus 4 is 10. Then I took away 2 more to get 8. 6 = 4 + 2 14 – 4 = 10 10 – 2 = 8</td>
<td>I thought, ‘6 and what makes 14?’ I know that 6 plus 6 is 12 and two more is 14. That’s 8 altogether. So, that means that 14 minus 6 is 8. 6 + 8 = 14 14 + 1 = 15 14 – 6 = 8</td>
</tr>
</tbody>
</table>
### Domain: 1.OA
#### Cluster: 1.OA.A Represent and solve problems involving addition and subtraction.

**1.OA.A.1 Apply properties of operations and explore unknowns in all positions.**

- Students need **significant exposure** to all 12 problem types, but they are not expected to master all types by the end of first grade due to the high language and conceptual demands of the most difficult problem types. Placement of the unknown will determine the difficulty level of the problem situations.
  - The least complex for students are Result Unknown problems, followed by Total Unknown and Difference Unknown.
  - The next level of difficulty includes Change Unknown, Addend Unknown, followed by Bigger Unknown.
  - The most difficult are Start Unknown, Both Addends Unknown, and Smaller Unknown.

**Examples of problem formats:**
*(See also CCSS, page 88 Table 1: Common addition and subtraction situations.)*

<table>
<thead>
<tr>
<th>Add to</th>
<th>Result Unknown</th>
<th>Change Unknown</th>
<th>Start Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex. 1: Sanjay had 8 pencils. His friend gave him 7 more. How many pencils does Sanjay have now?</td>
<td>Ex. 1: 9 students were standing in line. Some more students joined the line. Now there are 13 students in line. How many joined the line?</td>
<td>Ex. 1: Dani had some stickers. Her teacher gave her 5 more. Now Dani has 11 stickers. How many did she have to begin with?</td>
<td></td>
</tr>
<tr>
<td>Ex. 2: Four children were playing a game and two more children joined them. Then 3 more children came to play the game. How many children are playing now?</td>
<td>Ex. 2: Beth had 8 pennies in her pocket and she found some more. Now she has 13 pennies. How many pennies did she find?</td>
<td>Ex. 2: Some cars were in the parking lot and three more drove in. Now there are 16 cars. How many cars were in the parking lot to begin with?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Take from</th>
<th>Result Unknown</th>
<th>Change Unknown</th>
<th>Start Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex. 1: Abel has 9 balls. He gave 3 to Susan. How many balls does Abel have now?</td>
<td>Ex. 1: 12 cars were in the lot. Some drove away, and now there are 6. How many cars drove away?</td>
<td>Ex. 1: Some frogs were on a log. 7 frogs hopped away, leaving 3 frogs still on the log. How many frogs were on the log to start?</td>
<td></td>
</tr>
<tr>
<td>Ex. 2: 12 birds are in a tree. 6 flew away. How many birds are in the tree now?</td>
<td>Ex. 2: 5 bears were in the cave. Some bears walked out. 3 bears are still in the cave. How many bears walked out?</td>
<td>Ex. 2: Some children were playing tag. 3 left the game, and 6 were still playing. How many were playing tag to begin with?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Unknown</th>
<th>Addend Unknown</th>
<th>Both Addends Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex. 1: 8 red and 6 yellow apples are on the tree. How many apples are on the tree?</td>
<td>Ex. 1: Sara read 7 books on Monday and some more books on Tuesday. Altogether she read 18 books. How many books did she read on Tuesday?</td>
<td>Ex. 1: 14 children are in the class. How many boys and girls could there be?</td>
</tr>
<tr>
<td>Ex. 2: Bernard has 4 red pencils, 5 blue pencils, and 6 green pencils. How many pencils does he have?</td>
<td>Ex. 2: We saw 12 reptiles at the pond. Nine were turtles and the rest were snakes. How many were snakes?</td>
<td>Ex. 2: The pet store has 16 puppies and kittens. How many of each kind of animal could be at the pet store?</td>
</tr>
</tbody>
</table>
### A Note about Comparison Situations:

These situations can be very challenging for young learners. The difference between the larger and smaller quantities is not physically present, and the language can be confusing. Initially give students discrete objects to model situations. Eventually expose students to tape diagrams.

Scaffold students’ understanding of the language by using sentence stems such as,

“How many ______ won’t get ______?”

“How many extra ______ are there?”

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<table>
<thead>
<tr>
<th>Difference Unknown</th>
<th>Bigger Unknown</th>
<th>Smaller Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex. 1: Abel has 9 balls. Susan has 6 balls. How many more balls does Abel have than Susan?</td>
<td>Ex. 1: Beth is 5 years younger than Jack. Beth is 8 years old. How old is Jack?</td>
<td>Ex. 1: We saw 3 fewer busses than cars. We saw 7 cars. How many busses did we see?</td>
</tr>
<tr>
<td>Ex. 2: The basket holds 8 muffins and 5 rolls. How many fewer muffins than rolls are there?</td>
<td>Ex. 2: Seven children chose vanilla ice cream. 4 more children chose chocolate than vanilla. How many children chose chocolate ice cream?</td>
<td>Ex. 2: The soccer team has 2 more girls than boys. The team has 7 girls. How many boys are on the team?</td>
</tr>
</tbody>
</table>

#### Types of Addition and Subtraction Situations, Part II

**Comparison Situations**

- **Unknown Difference**
  - All has 9 balloons.
  - Lisa has 13 balloons.
  - How Many More?
  - How many more balloons does Lisa have than All?
  - How Many Fewer?
  - How many fewer balloons does All have than Lisa?

<table>
<thead>
<tr>
<th>L</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>9</td>
</tr>
</tbody>
</table>

- **Unknown Bigger Amount**
  - All has 9 balloons.
  - Lisa has 4 more than All.
  - Mike has 4 fewer than Lisa.
  - How many balloons does Lisa have?

<table>
<thead>
<tr>
<th>L</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>9</td>
</tr>
</tbody>
</table>

- **Unknown Smaller Amount**
  - Lisa has 13 balloons.
  - All has 4 fewer than Lisa.
  - How many balloons does All have?

<table>
<thead>
<tr>
<th>L</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>9</td>
</tr>
</tbody>
</table>
Modeling from concrete to abstract models of thinking:
  - There are 6 people and 4 chairs. How many more people are there than chairs?
    - Rephrase as “How many people won’t get chairs? How many extra chairs are there?”

<table>
<thead>
<tr>
<th>Initially introduce comparisons with matching discrete objects:</th>
<th>Eventually move toward tape diagrams to model relationships:</th>
</tr>
</thead>
<tbody>
<tr>
<td>People: ☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
<td>People: ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>Chairs: ☐ ☐ ☐ ☐</td>
<td>Chairs: ☐ ☐ ☐ ☐ ☐ ☐ ☐</td>
</tr>
</tbody>
</table>

Domain: 1.OA
Cluster: 1.OA.B Understand and apply properties of operations and the relationship between addition and subtraction.

1.OA.B.3 Apply properties of operations as strategies to add and subtract. Examples: If $8 + 3 = 11$ is known, then $3 + 8 = 11$ is also known. (Commutative property of addition.) To add $2 + 6 + 4$, the second two numbers can be added to make a ten, so $2 + 6 + 4 = 2 + 10 = 12$. (Associative property of addition.)

- Elementary students often believe that there are hundreds of isolated addition and subtraction facts to be mastered. However, when students understand the commutative and associative properties, they are able to use relationships between and among numbers to solve problems. First Grade students apply properties of operations as strategies to add and subtract. Students do not use the formal terms “commutative” and “associative”. Rather, they use the understandings of the commutative and associative property to solve problems.

- Students should develop an understanding of the important ideas of the following properties (although they do not need to know the names of the properties):

<table>
<thead>
<tr>
<th>Commutative Property of Addition</th>
<th>Associative Property of Addition</th>
</tr>
</thead>
<tbody>
<tr>
<td>The order of the addends does not change the sum.</td>
<td>The grouping of the 3 or more addends does not affect the sum.</td>
</tr>
<tr>
<td>For example, if $8 + 2 = 10$ is known, then $2 + 8 = 10$ is also known.</td>
<td>For example, when adding $2 + 6 + 4$, the sum from adding the first two numbers first ($2 + 6$) and then the third number (4) is the same as if the second and third numbers are added first ($6 + 4$) and then the first number (2). The student may note that $6 + 4$ equals 10 and add those two numbers first before adding 2. Regardless of the order, the sum remains 12.</td>
</tr>
</tbody>
</table>

  - Identity property of addition (e.g., $6 = 6 + 0$)
  - Identity property of subtraction (e.g., $9 - 0 = 9$)
Students should use mathematical tools and representations (e.g., cubes, counters, number balance, number line, 100 chart) to model these ideas.

**Commutative Property Examples:**

- **Cubes**
  
  A student uses 2 colors of cubes to make as many different combinations of 8 as possible. When recording the combinations, the student records that 3 green cubes and 5 blue cubes equals 8 cubes in all. In addition, the student notices that 5 green cubes and 3 blue cubes also equals 8 cubes.

- **Number Balance**
  
  A student uses a number balance to investigate the commutative property. “If 8 and 2 equals 10, then I think that if I put a weight on 2 first this time and then on 8, it’ll also be 10.”

**Associative Property Examples:**

- **Number Line:** $10 = 5 + 4 + 5$

  **Student A:** First I jumped to 5. Then, I jumped 4 more, so I landed on 9. Then I jumped 5 more and landed on 14.

  ```plaintext
  5 4 5
  5 9 14
  ```

  **Student B:** I got 14, too, but I did it a different way. First I jumped to 5. Then, I jumped 5 again. That’s 10. Then, I jumped 4 more. See, 14!

  ```plaintext
  5 5 4
  5 10 14
  ```

- **Mental Math:** There are 9 red jelly beans, 7 green jelly beans, and 3 black jelly beans. How many jelly beans are there in all?

  **Student:** “I know that 7 + 3 is 10. And 10 and 9 is 19. There are 19 jelly beans.”
1.OA.B.4 Understand subtraction as an unknown-addend problem. For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.

- In order to reinforce the relationship between addition and subtraction, students should have multiple opportunities to consider how the answer to a subtraction problem, such as 12 – 8, can be recorded to match student’s counting up strategy e.g., “I have 8, how many more do I need to make 12?” In this case, using the format of an unknown e.g., 8 + ? = 12.

- Posing Add to Change Unknown stories and Take from Change Unknown stories can support students in this thinking. For example: Micah had 8 markers. His aunt gave him some more, and now he has 12. How many markers did his aunt give him? This could be solved with 12-8. However, the context leads to an “adding up” way of thinking: 8 + __ = 12.

- First Graders often find subtraction facts more difficult to learn than addition facts. By understanding the relationship between addition and subtraction, students are able to use various strategies described below to solve subtraction problems.

- When determining the answer to a subtraction problem, 12 - 5, students could think, “If I have 5, how many more do I need to make 12?” Encouraging students to record this symbolically, 5 + ? = 12, will develop their understanding of the relationship between addition and subtraction. Some strategies they may use are counting objects, creating drawings, counting up, using number lines, 10 frames, or diagrams to determine an answer.
  - Example: “I used a part-part-whole diagram. I put 5 counters on one side. I wrote 12 above the diagram. I put counters into the other side until there were 12 in all. I know I put 7 counters into the other side, so 12 - 5 = 7.”

For Sums to 10

- Think-Addition:
  
  Think-Addition uses known addition facts to solve for the unknown part or quantity within a problem. When students use this strategy, they think, “What goes with this part to make the total?” The think-addition strategy is particularly helpful for subtraction facts with sums of 10 or less and can be used for sixty-four of the 100 subtraction facts. Therefore, in order for think-addition to be an effective strategy, students must have mastered addition facts first.

  For example, when working with the problem 9 - 5 = 4, First Graders think “Five and what makes nine?”, rather than relying on a counting approach in which the student counts 9, counts off 5, and then counts what’s left. When subtraction is presented in a way that encourages students to think using addition, they use known addition facts to solve a problem.

  Example: 10 – 2 = 8

  Student: “2 and what make 10? I know that 8 and 2 make 10. So, 10 – 2 = 8.”

For Sums Greater than 10

The 36 facts that have sums greater than 10 are often considered the most difficult for students to master. Many students will solve these particular facts with Think-Addition (described above), while other students may use other strategies described below, depending on the fact. Regardless of the strategy used, all strategies focus on the relationship between addition and subtraction and often use 10 as a benchmark number.
Build Up Through 10:
This strategy is particularly helpful when one of the numbers to be subtracted is 8 or 9. Using 10 as a bridge, either 1 or 2 are added to make 10, and then the remaining amount is added for the final sum.

Example: $15 - 9 = \underline{6}$

Student A: “I’ll start with 9. I need one more to make 10. Then, I need 5 more to make 15. That’s 1 and 5, which makes 6. $15 - 9 = 6$.”

Student B: “I put 9 counters on the 10 frame. Just looking at it I can tell that I need 1 more to get to 10. Then I need 5 more to get to 15. So, I need 6 counters.”

Back Down Through 10:
This strategy uses take-away and 10 as a bridge. Students take away an amount to make 10, and then take away the rest. It is helpful for facts where the ones digit of the two-digit number is close to the number being subtracted.

Example: $16 - 7 = \underline{9}$

Student A: “I’ll start with 16 and take away 6. That makes 10. I’ll take one more off and that makes 9. $16 - 7 = 9$.”

Student B: “I used 16 counters to fill one ten frame completely and most of the other one. Then, I can take these 6 off from the 2nd ten frame. Then, I’ll take one more from the first ten frame. That leaves 9 on the ten frame.”

Domain: 1.OA
Cluster: 1.OA.D Work with addition and subtraction.

1.OA.D.8 Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations $8 + ? = 11$, $5 = _ - 3$, $6 + 6 = _$.

- Grade 1 students use their understanding of strategies related to addition and subtraction as described in 1.OA.4 and 1.OA.6 to solve equations with an unknown. Rather than variables, the unknown symbols are boxes, pictures, or a question mark.
- Students should explore problems with the unknown in different positions as well as quantities on the other side of the equal sign.
**Example:** Five cookies were on the table. I ate some cookies. Then there were 3 cookies. How many cookies did I eat?

Student A:
5 - □ = 3
What goes with 3 to make 5? 3 and 2 is 5. So, 2 cookies were eaten.

Student B:
5 - □ = 3
Fiiiive, four, three (holding up 1 finger for each count). 2 cookies were eaten (showing 2 fingers).

Student C:
5 - □ = 3
We ended with 3 cookies. Threeee, four, five (holding up 1 finger for each count). 2 cookies were eaten (showing 2 fingers).

**Example:** Determine the unknown number that makes this equation true: 15 - □ = 6.

**Student:** 15 minus something is the same amount as 6. Hmmm. 6 and what makes 15? 9! So, 15 minus 9 equals 6. Now it’s true!

- Have students create word problems for given equations will help them make sense of the equation and develop strategic thinking.

**Example:** Write a word problem to match this equation: 8 + □ = 19

**Student:** I had 8 t-shirts in my drawer. My mom put away some more clean shirts, and now there are 19 t-shirts in the drawer. How many t-shirts did Mom wash?

**Student:** There were 8 fourth graders playing basketball, and then some fifth graders came over to play. Now there are 19 kids playing on the basketball court. How many of them are fifth graders?

- Students should communicate and justify their thinking.

**Examples of possible student “think-throughs” when considering the unknown:**

- 8 + □ = 11: 8 and some number is the same as 11. 8 and 2 is 10 and 1 more makes 11. So the answer is 3.
- 5 = □ − 3: This equation means I had some cookies and I ate 3 of them. Now I have 5. How many cookies did I have to start with? Since I have 5 left and I ate 3, I know I started with 8 because I can count on from 5. . . 6, 7, 8.
### Differentiation

#### 1.OA.C Add and subtract within 20.
- Students need much practice developing strategies based on decomposing and recomposing single-digit numbers
  \[ 5 + 7 = 2 + (3 + 7) \text{ as well as decomposing and composing numbers by units of tens and ones,} \]
  \[ e.g., \ 5 + 7 = 2 + (3 + 7) = 10 + 2 = 12. \]

#### 1.OA.A Represent and solve problems involving addition and subtraction within 20
- Students need to move through a progression of representations to learn a concept. They start with a concrete model (level 1 – direct model), move to a pictorial or representational model (level 2 - counting on or back), then an abstract model (level 3 – convert to an easier problem). Students start with level 1 situations, but will individually make progress as developmentally appropriate.

#### 1.OA.B Understand and apply properties of operations and the relationship between addition and subtraction.
- After students have discovered and applied the commutative property for addition, ask them to investigate whether this property works for subtraction. Students should study number expressions and the patterns they make for both addition and subtraction. To move to a generalization, some students need to work with larger numbers while others will have to have smaller numbers and models to manipulate. Have students share and discuss their reasoning and guide them to conclude that the commutative property does not apply to subtraction.

#### 1.OA.D Work with addition and subtraction equations.
- After students have discovered and applied the commutative property for addition, ask them to investigate whether this property works for subtraction. Students should study number expressions and the patterns they make for both addition and subtraction. To move to a generalization, some students need to work with larger numbers while others will have to have smaller numbers and models to manipulate. Have students share and discuss their reasoning and guide them to conclude that the commutative property does not apply to subtraction.

### The Common Core Approach to Differentiating Instruction
*How to Implement a Story of Units, p. 14-20*
*Linked document includes scaffolds for English Language Learners, Students with Disabilities, Below Level Students, and Above Level Students.*

### Resources

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